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Medtronic Inc.

By Juanita D. Traufler Date 11-28-01

Juanita I. Traufler

PATENT APPLICATION

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicant(s)	: Jesus W. Casas-Bejar, Darrel F. Untereker, Maura G. Donovan, Qinghong Zhao, Brian C.A. Fernandes, Timothy H. Robinson, Peter T. Schroeder	
Serial No.	: To Be Assigned	Group Art Unit:
Filed	: Herewith	
For	: Medical Electrical Leads and Indwelling Catheters With Enhanced Biocompatibility and Biostability	Examiner:
Docket No.	: 7109.03 Continuation	

Preliminary Amendment

Assistant Commissioner for Patents

Washington, D. C. 20231

Sir:

Applicants submit their preliminary amendment with their continuing application filed, claiming priority to US Application Number 09/063,227. In communication with Examiner Thissell, this continuing application was filed to supersede application 09/358,341, now abandoned. Applicants submit amendments to forward the prosecution that had occurred in the prior application (09/358,341). Applicants amendments and arguments are directed to the examination (dated 04/25/01, paper 17) of this previous application.

Applicants submit amendments and their reply to the office action dated April 10, 2001, to the 09/358,341 application. In the previous Office Action received by the

Applicants, the Examiner rejected pending claims 1-12, 26, 28, 30-32, and 35. Applicants respectfully request consideration of the above-captioned application in view of the previous application.

Applicants authorize the office to charge deposit account No. 13-2546, in the name of Medtronic, Inc., the fee under 37 C.F.R. §1.17(c) for any additional fees necessary related to this application.

Amendments

Please cancel, without prejudice claims 13-25, 27-29, and 33-34.

Please amend this application as contained in the submitted amendments, claims 1, 12, 26, 28, 30, and 31.:

Applicants submit herewith:

A clean version of the amended claims;

A marked-up version of the claims.

The submitted marked-upped versions of the claims and paragraphs of the specification follow standard amendment rules, wherein added text has been underlined and deleted text has been bracketed.

Explanation of Amendments To The Claims

Claims 1, 12, 26, 28, 30, and 31 have been amended to indicate that the insulative lead body comprises "an overcoating of a non-porous polymer intimately mixed with a steroidal anti-inflammatory agent."

Applicants submit that the amended claims are fully supported by the specification as filed, and that above indicated amendments do not add new matter. Support in the specification that the steriodial anti-inflammatory agent can be intimately mixed with the polymer and used as an overcoating of the lead body can be found on page 13, lines 26-31, and elsewhere in the application.

Previous Claim Rejections Under 35 USC § 112

In serial number 09/368,341, Claims 1-11 were previously rejected under 35 U.S.C 112, second paragraph, as being indefinite for inadvertently omitting the word "polymer" after the word "non-porous" in claim 1, line 9.

Applicants have submitted their preliminary amendment so not to omitted word "polymer" after the word "non-porous." Applicants respectfully request the present rejection under 35 U.S.C 112, second paragraph, not be reissued.

Claim Rejections Under 35 USC § 103, Ronan In View of Fearnot

In serial number 09/368,341, all claims pending were rejected over Ronan et al. (US 5,820,918 – herein Ronan) in view of Fearnot et al. (US 5,609,629 – herein Fearnot).

The Examiner cited Ronan for teaching a non-porous polymer for delivery of a medicament (including anti-coagulants and anti-inflammatory agents) as part of a medical device, such as a catheter (col. 2, lines 30-31; col. 3, line 22, col. 3, lines 44-46). The Examiner has also recognized that Ronan does not itself teach that the device is an electrical lead, or that the medicament is specifically heparin or that the anti-inflammatory agents are non-steroidal, or that the outer layer is made from silicone.

In view of the elements taught by Ronan, the Examiner additionally cited Fearnot for suggesting an electric lead (col. 6, lines 25-27) having a medicament-filled layer 20 (col. 9, line 46) (dexamethasone – col. 8, line 66) and for teaching that a catheter can have heparin embedded in it (col. 8, line 49). The Examiner also uses Fearnot for teaching that the device can be a "cardiac pacemaker lead or a defibrillator lead." Fearnot was also been cited for teaching that the electrical leads (by their conventional "definition") have a conducting material within them, and that they are attached somehow to cardiac tissue. It was indicated that Fearnot taught that the base material 14 can be a conductive metal (col. 7, lines 5+) and that the conductive material is inherently present in an electrical lead (col. 6, lines 25-27).

The Examiner recognizes that Fearnot does not teach that the catheter (sic – electric lead) outer layer is made of silicone (col. 7, line 9), but argues that since silicone is a material well known to be used in forming catheters and other medical devices, it would have been obvious to form the outer porous layer of silicone, especially since Fearnot already teaches that part of the device can be made from it.

Therefore, the Examiner contends it would have been obvious to one of ordinary skill in the art to coat a device such as an electrical lead (as taught by Fearnot) with the non-porous, medicament-filled coating of Ronan, since, Ronan teaches that the coating is intended for use with medical devices such as catheters (the Examiner contending that leads are also elongated bodies inserted like catheters), and also because Fearnot teaches that his device can also be a catheter, thus indicating that the coating is desirable for both catheters and electrical leads in order to prevent coagulation, inflammation, or infection. The Examiner contends it would also have been obvious to use heparin (as taught by Fearnot) as the anti-coagulant. Likewise it would have been obvious to use non-steroidal anti-inflammatory agents as taught by Fearnot in the device of Ronan for similar reasons.

Response to Previous Claim Rejections Under 35 USC § 103, Ronan In View of Fearnot

Applicants respectfully traverse Examiner's previous rejections based on the cited references, because they do not teach or suggest an insulative lead body which comprises an over coating of a non-porous polymer in which a steroidal anti-inflammatory agent is intimately mixed with the polymer.

Respectfully, Applicants submit that both Ronan and Fearnot use porous synthetic materials to allow exit of a pharmaceutical agent. Ronan uses the porous synthetic material (hydrogel) to capture and hold the drug material because it is absorbed in the aqueous interstices of the polymer. In contrast, Fearnot uses a porous polymer as a protective coating over an inner drug layer – these being distinct layers. The porous polymer protective coating (the overcoat) does not incorporate the drug. Neither Fearnot nor Ronan directly incorporate the drug into a "non-porous over-coating."

It should also be noted that Ronan's pharmaceutical agent is directed principally to inorganic ionic salts that are diffused into the porous matrix (hydrogel). Ronan impregnates ionic inorganic drugs into a water absorbable hydrogel, in a two-step infusion process. The ionic salts may have organic counter ions that are used as part of the infusion step, but the principal active ions that form in the matrix are inorganic ions (see Table 1, col.4, line 14, or any of the other tables). Exemplified in the tables are AgCl, BaSO4. Ronan does not teach the use of steroids (steroids by definition are organic molecules – not inorganic molecules). Further, there is no suggestion or motivation that solutions for infusing active inorganic molecules into a non-porous polymer would work or are applicable for organic drugs, let alone for steroids, and may in fact constitute an improperly combinable reference because of this difference.

It is noted that Fearnot does teach use of anti-inflammatory agents such as steroids, including dexamethasone. However, it should be noted that both Fearnot and Ronan use a "porous" polymer, not a "non-porous" polymer, to incorporate or allow diffusion of their active materials to the tissue. Neither Fearnot nor Ronan teach or suggest incorporation of the active agent (steroidal anti-inflammatory agent) into an over coating of a non-porous polymer. Further, both Fearnot and Ronan suggest using a porous polymer (albeit used differently), and taken together would teach away from using a non-porous polymer as part of the drug matrix. Applicants respectively request that in view of their amendments and arguments presented, that the present rejection not reissue.

Previous Claim Rejections Under 35 USC § 103 of Ronan In View of Fearnot

In serial number 09/368,341, the Examiner previously rejected method claims 26 and 28 because it would have been obvious to implant the leads into a patient because it is would be used for its intended use. The Examiner also indicates there is no positive method step to implant.

Applicants respectively traverse that it would have been obvious to implant the claimed lead because the lead as claimed is novel and unobvious in view of Applicants remarks regarding the Ronan and Fearnot references. Applicants' have developed a novel and unobvious non-porous polymer for containing a steroidal anti-inflammatory

agent. Applicants also direct the Examiner attention to the positive step recited of "implanting the lead into a patient" as a positive method step to implant. In view of Applicants arguments, Applicants respectively submit that claims 26 and 28 are patentable over the art.

Previous Claim Rejections Under 35 USC § 103, Ronan In View of Fearnot

In serial number 09/368,341, the Examiner also rejected method claims 30-32 and 35, stating that it would be obvious to assemble the device with the structure as claimed. The Examiner also indicates that the claims do not claim any specifics about the assembly.

Applicants respectively traverse that it would have been obvious to assemble the claimed lead because the lead as claimed is novel and unobvious. Applicants' previous remarks distinguish the Ronan and Fearnot references upon which the present rejection is based. In view of Applicants' previous remarks, it would be novel and unobvious to assemble a lead not previously recognized in the art. There would be no basis to assemble such a lead where there was no basis for its existence. Applicants have developed a novel and unobvious lead that uses a non-porous polymer for containing a steroidal anti-inflammatory agent.

Applicants also direct the Examiner's attention to the positive steps recited in the claims of "assembling the lead." In view of Applicants' arguments, Applicants respectively submit that claims 30-32 and 35 are patentable over the art.

Previous Claim Rejections Under 35 USC § 103 of Ronan In View of Fearnot

In serial number 09/368,341, Claim 10 was previously rejected under 35 USC 103(a) as being unpatentable over Ronan and Fearnot et al. as applied to claim 1 above, and further in view of Hendricks et al. (US '151). Ronan as modified by Fearnot teaches all the claimed subject matter of claim 10 except for the anti-inflammatory agent being covalently bonded to the polymer surface. Hendricks teaches a pacemaker lead (col 4, line5) having an anti-inflammatory agent (col. 4, lines 23-24), wherein the agent is covalently bonded to the surface of the lead (col. 4, lines 33-35). In view of the cited references the Examiner finds it would have been obvious to one of ordinary skill in the

art to use the covalent bonding as taught by Hendricks to embed the anti-inflammatory agent of Ronan modified by Fearnot since this is a typical way of bonding the agent to the polymer.

Applicants have amended claims more clearly indicate that the anti-inflammatory agent is intimately mixed with in the overcoat layer. Hendricks teaches chemically modifying preformed polymers by cross-linking active agents to the outer surface of the polymer using surface grafting techniques. Hendricks does not teach blending the active agent into the overcoat layer in its formation whether or not it is cross-linked to the agent. Applicants, therefore, respectfully assert that claim 10 is patentable over the art as well, in view of their arguments regarding Ronan and Fearnot.

In view of the submitted amendments and arguments applicants believe the claimed subject matter is novel and unobvious over the prior art and anxiously await the examiner's review and approval to issue the enclosed claims.

Respectfully submitted,

11/28/01

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AMENDED CLAIMS

(Version with Markings To Show Changes Made)

1.(Amended) A medical electrical lead comprising:

an elongated insulative lead body, having a tissue-contacting surface, a proximal end, and a distal end;

an elongated conductor having a proximal end and a distal end, mounted within the insulative lead body; and

an electrode coupled to the distal end of the electrical conductor form making electrical contact with bodily tissue; and

wherein the tissue-contacting surface of the insulative lead body comprises [a] an overcoating of a non-porous polymer [in intimate contact with] intimately mixed with a steroidal anti-inflammatory agent.

2. The medical electrical lead of claim 1 wherein the polymer is selected from the group of polyurethanes, silicones, polyamides, polyimides, polycarbonates, polyethers, polyesters, polyvinyl aromatics, polytetrafluoroethylenes, polyolefins, acrylic polymers or copolymers, vinyl halide polymers or copolymers, polyvinyl ethers, polyvinyl esters, polyvinyl ketones, polyvinylidine halides, polyacrylonitriles, copolymers of vinyl monomers with each other and olefins, and combinations thereof.

3. The medical electrical lead of claim 2 wherein the polymer is selected from the group of polyurethanes, silicones, or combinations thereof.

4. The medical electrical lead of claim 1 wherein the anti-inflammatory agent is a glucocorticosteroid.

5. The medical electrical lead of claim 4 wherein the glucocorticosteroid is selected from the group of cortisol, cortisone, fludrocortisone, Prednisone, Prednisolone, 6α-methylprednisolone, triamcinolone, betamethasone, dexamethasone, beclomethasone, aclomethasone, amcinonide, clebethasol, clocortolone, derivatives thereof, and salts thereof.

6. The medical electrical lead of claim 5 wherein the glucocorticosteroid is dexamethasone, a derivative thereof, or a salt thereof.

7. The medical electrical lead of claim 1 wherein the anti-inflammatory agent is coated onto the tissue-contacting surface.

8. The medical electrical lead of claim 1 wherein the tissue-contacting surface comprises an anti-inflammatory agent incorporated into a polymeric overcoating.

9. The medical electrical lead of claim 1 wherein the anti-inflammatory agent is impregnated into the polymer of the tissue-contacting surface.

10. The medical electrical lead of claim 1 wherein the anti-inflammatory agent is covalently bonded to the polymer of the tissue-contacting surface.

11. The medical electrical lead of claim 1 wherein the tissue-contacting surface further includes heparin.

12. A medical electrical lead comprising:

an elongated insulative lead body having a tissue-contacting surface, a proximal end, and a distal end;

an elongated conductor having a proximal end and a distal end, mounted within the insulative lead body; and

an electrode coupled to the distal end of the electrical conductor for making electrical contact with bodily tissue;

wherein the tissue-contacting surface of the insulative lead body consists essentially of [a] an overcoating of a nonporous polymer [in intimate contact] intimately mixed with a steroidal anti-inflammatory agent.

26.(Amended) A method of modulating tissue encapsulation of a medical electrical lead comprising implanting the lead into a patient, wherein the medical electrical lead comprises:

an elongated insulative lead body having a tissue-contacting surface, a proximal end, and a distal end;

an elongated conductor having a proximal end and a distal end, mounted within the insulative lead body; and

an electrode coupled to the distal end of the electrical conductor for making electrical contact with bodily tissue; and

wherein the tissue-contacting surface of the insulative lead body comprises [a] an overcoating of a non-porous polymer [in intimate contact] intimately mixed with a steroidal anti-inflammatory agent.

28.(Amended) A method of modulating degradation of a medical electrical lead comprising implanting the lead into a patient, wherein the medical electrical lead comprises:

an elongated insulative lead body having a tissue-contacting, a proximal end, and a distal end;

an elongated conductor having a proximal end and a distal end, mounted within the insulative lead body; and

an electrode coupled to the distal end of the electrical conductor for making electrical contact with bodily tissue; and

wherein the tissue-contacting surface of the insulative lead body comprises [a] an overcoating of a non-porous polymer [in intimate contact with] intimately mixed with a steroidal anti-inflammatory agent.

30.(Amended) A method of making a medical electrical lead comprising:

providing an elongated insulative lead body having a tissue-contacting surface, a proximal end, and a distal end; wherein the tissue-contacting surface comprises[a] an overcoating of a non-porous polymer [in intimate contact] intimately mixed with a steroidal anti-inflammatory agent[is incorporated];

providing an elongated conductor having a proximal end and a distal end;

mounting the elongated conductor within the insulative lead body; and

coupling an electrode to the distal end of the electrical conductor for making electrical contact with bodily tissue.

31.(Amended) The method of claim 30 wherein the step of providing an elongated insulative lead body comprises blending [a] the steroidal anti-inflammatory agent with [a] the non-porous polymer and forming [a polymer and forming the] said tissue-contacting surface.

32. The method of claim 30 wherein the step of providing an elongated insulative lead body comprises coating a steroidal anti-inflammatory agent onto the tissue-contacting surface of the lead body.

35. The method of claim 30 wherein the step of providing an elongate body comprises coating a steroidal anti-inflammatory agent onto the tissue-contacting surface of the elongate body.

AMENDED CLAIMS

1.(Amended) A medical electrical lead comprising:

an elongated insulative lead body, having a tissue-contacting surface, a proximal end, and a distal end;

an elongated conductor having a proximal end and a distal end, mounted within the insulative lead body; and

an electrode coupled to the distal end of the electrical conductor form making electrical contact with bodily tissue; and

wherein the tissue-contacting surface of the insulative lead body comprises an overcoating of a non-porous polymer intimately mixed with a steroidal anti-inflammatory agent.

2. The medical electrical lead of claim 1 wherein the polymer is selected from the group of polyurethanes, silicones, polyamides, polyimides, polycarbonates, polyethers, polyesters, polyvinyl aromatics, polytetrafluoroethylenes, polyolefins, acrylic polymers or copolymers, vinyl halide polymers or copolymers, polyvinyl ethers, polyvinyl esters, polyvinyl ketones, polyvinylidine halides, polyacrylonitriles, copolymers of vinyl monomers with each other and olefins, and combinations thereof.

3. The medical electrical lead of claim 2 wherein the polymer is selected from the group of polyurethanes, silicones, or combinations thereof.

4. The medical electrical lead of claim 1 wherein the anti-inflammatory agent is a glucocorticosteroid.

5. The medical electrical lead of claim 4 wherein the glucocorticosteroid is selected from the group of cortisol, cortisone, fludrocortisone, Prednisone, Prednisolone, 6α-methylprednisolone, triamcinolone, betamethasone,

dexamethasone, beclomethasone, aclomethasone, amcinonide, clebethasol, clocortolone, derivatives thereof, and salts thereof.

6. The medical electrical lead of claim 5 wherein the glucocorticosteroid is dexamethasone, a derivative thereof, or a salt thereof.

7. The medical electrical lead of claim 1 wherein the anti-inflammatory agent is coated onto the tissue-contacting surface.

8. The medical electrical lead of claim 1 wherein the tissue-contacting surface comprises an anti-inflammatory agent incorporated into a polymeric overcoating.

9. The medical electrical lead of claim 1 wherein the anti-inflammatory agent is impregnated into the polymer of the tissue-contacting surface.

10. The medical electrical lead of claim 1 wherein the anti-inflammatory agent is covalently bonded to the polymer of the tissue-contacting surface.

11. The medical electrical lead of claim 1 wherein the tissue-contacting surface further includes heparin.

12. A medical electrical lead comprising:

an elongated insulative lead body having a tissue-contacting surface, a proximal end, and a distal end;

an elongated conductor having a proximal end and a distal end, mounted within the insulative lead body; and

an electrode coupled to the distal end of the electrical conductor for making electrical contact with bodily tissue;

wherein the tissue-contacting surface of the insulative lead body consists essentially of an overcoating of a nonporous polymer intimately mixed with a steroidal anti-inflammatory agent.

26.(Amended) A method of modulating tissue encapsulation of a medical electrical lead comprising implanting the lead into a patient, wherein the medical electrical lead comprises:

an elongated insulative lead body having a tissue-contacting surface, a proximal end, and a distal end;

an elongated conductor having a proximal end and a distal end, mounted within the insulative lead body; and

an electrode coupled to the distal end of the electrical conductor for making electrical contact with bodily tissue; and

wherein the tissue-contacting surface of the insulative lead body comprises an overcoating of a non-porous polymer intimately mixed with a steroidal anti-inflammatory agent.

28.(Amended) A method of modulating degradation of a medical electrical lead comprising implanting the lead into a patient, wherein the medical electrical lead comprises:

an elongated insulative lead body having a tissue-contacting, a proximal end, and a distal end;

an elongated conductor having a proximal end and a distal end, mounted within the insulative lead body; and

an electrode coupled to the distal end of the electrical conductor for making electrical contact with bodily tissue; and

wherein the tissue-contacting surface of the insulative lead body comprises an overcoating of a non-porous polymer intimately mixed with a steroidal anti-inflammatory agent.

30.(Amended) A method of making a medical electrical lead comprising:

providing an elongated insulative lead body having a tissue-contacting surface, a proximal end, and a distal end; wherein the tissue-contacting surface comprises an overcoating of a non-porous polymer [in intimate contact] intimately mixed with a steroidal anti-inflammatory agent;

providing an elongated conductor having a proximal end and a distal end;

mounting the elongated conductor within the insulative lead body; and

coupling an electrode to the distal end of the electrical conductor for making electrical contact with bodily tissue.

31.(Amended) The method of claim 30 wherein the step of providing an elongated insulative lead body comprises blending the steroidal anti-inflammatory agent with the non-porous polymer and forming said tissue-contacting surface.

32. The method of claim 30 wherein the step of providing an elongated insulative lead body comprises coating a steroidal anti-inflammatory agent onto the tissue-contacting surface of the lead body.

35. The method of claim 30 wherein the step of providing an elongate body comprises coating a steroidal anti-inflammatory agent onto the tissue-contacting surface of the elongate body.